Federal Agency for Cartography and Geodesy

AIUB

TECHNISCHE UNIVERSITÄT MÜNCHEN

Pre-combined GNSS-SLR solutions for the ITRF2013

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Current ITRF approach

IDS

IGS INTERNATIONAL GNSS SERVICE

International Laser Ranging Service

IVS

Combined SINEX DORIS

Combined SINEX GNSS

Combined SINEX SLR

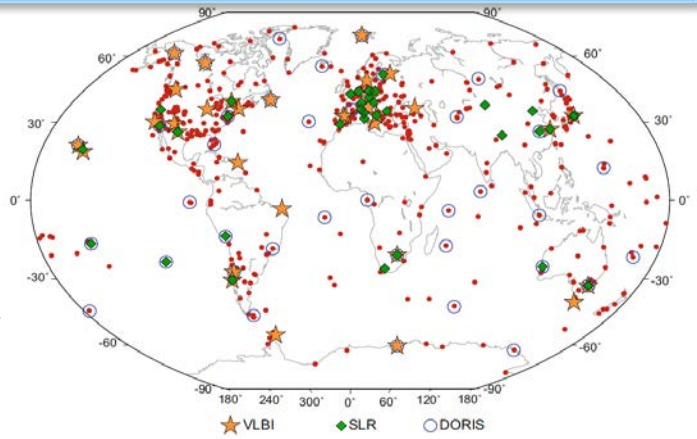
Combined SINEX VLBI

Inter-technique Combination
DORIS + GNSS + SLR + VLBI

IGN, Paris

DGFI, München

JPL, Pasadena



Call for ITRF2013: pre-combined solutions

IDS

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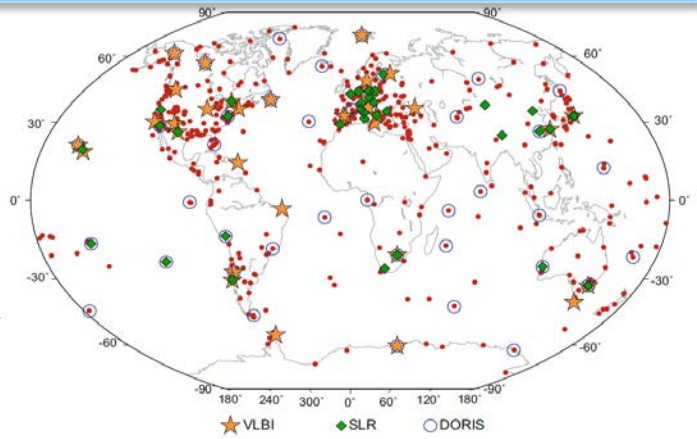
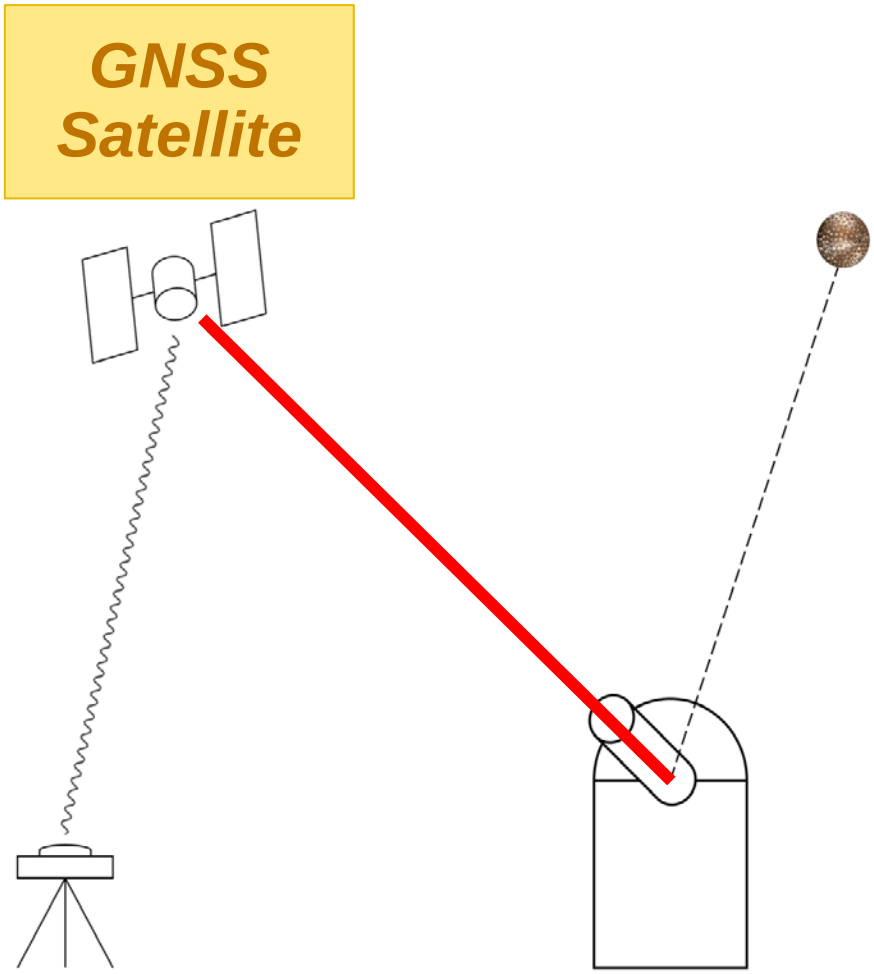


Satellite co-locations GNSS-SLR

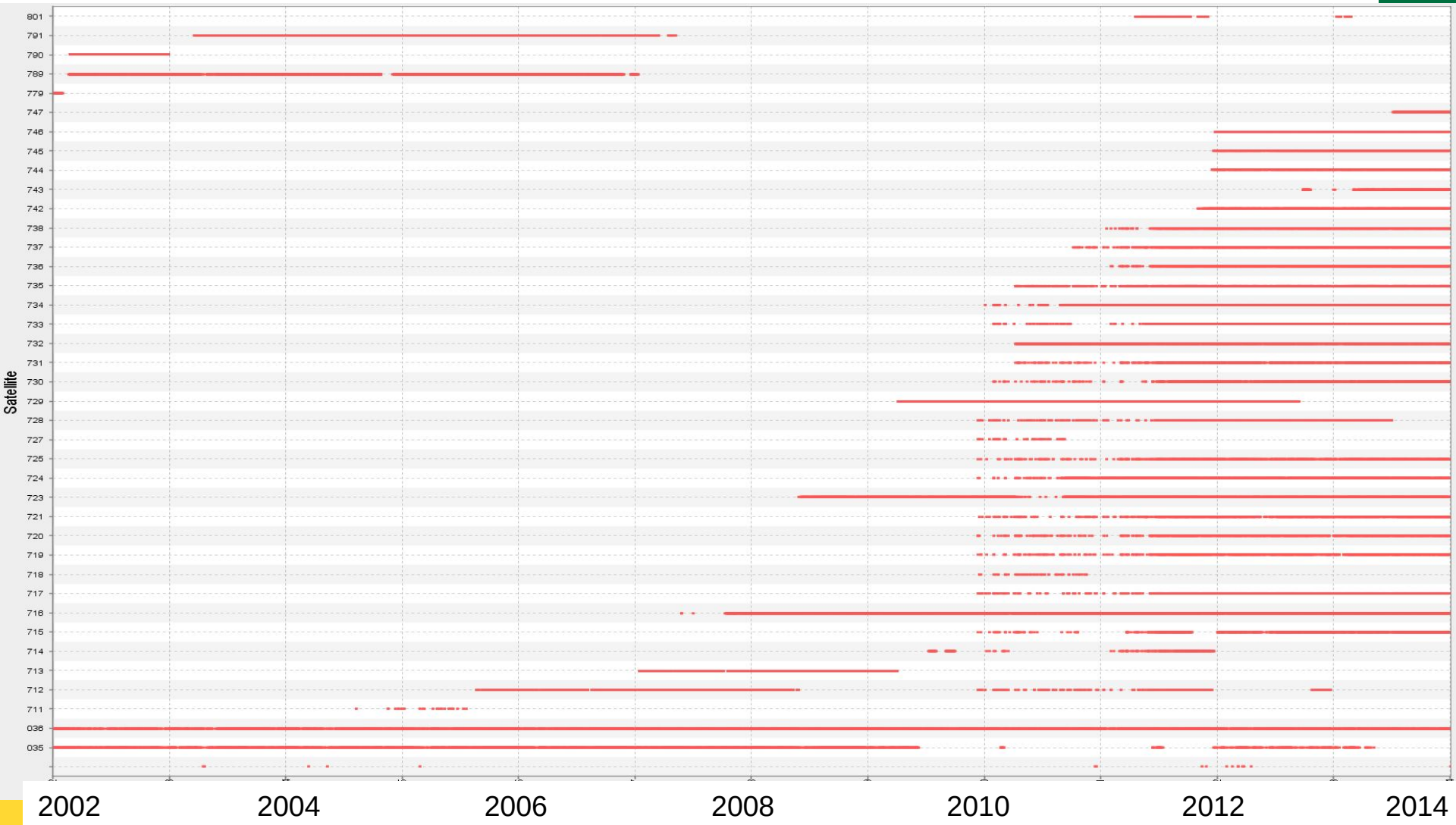


Additional information needed:

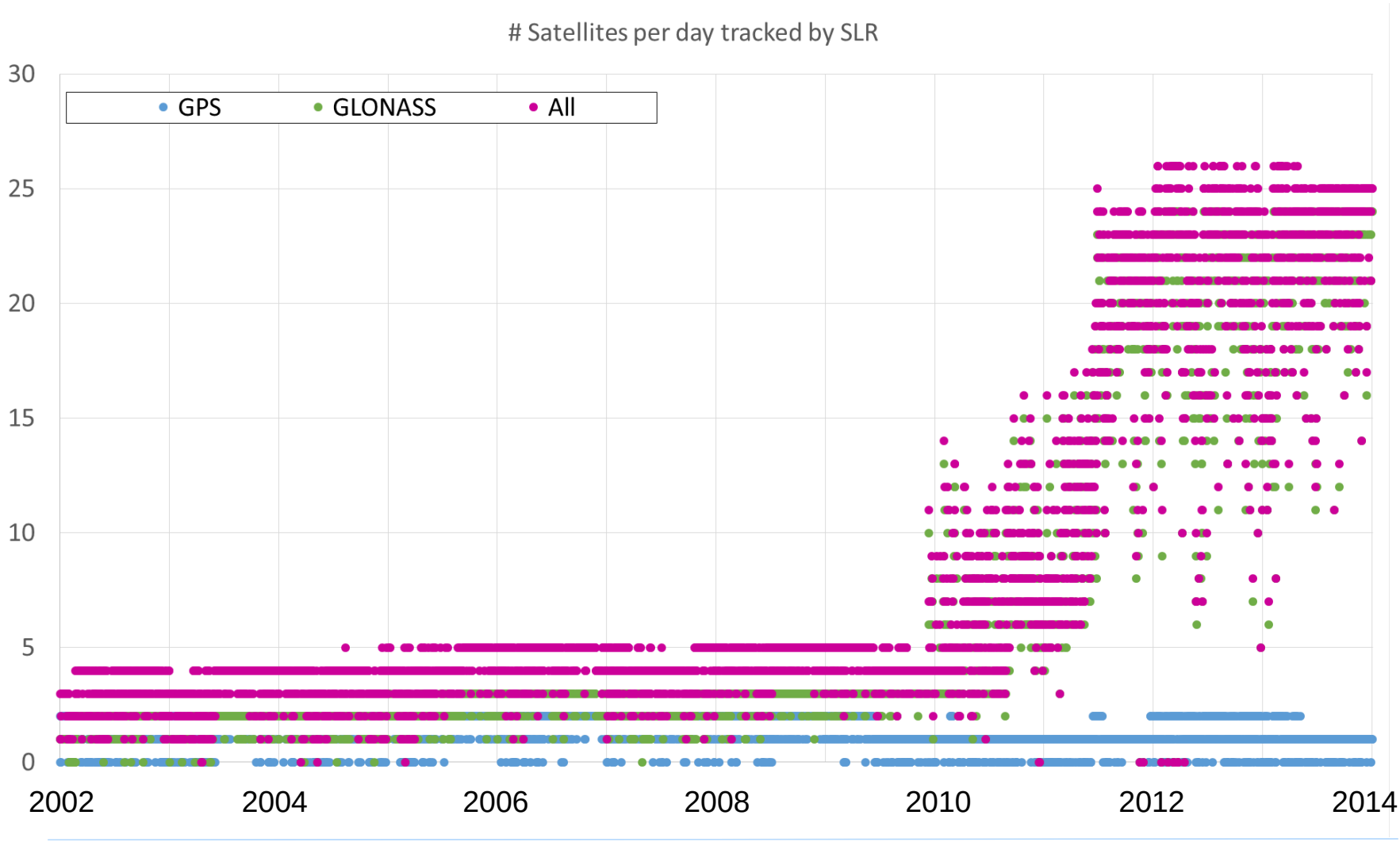
- Offset of **microwave satellite antenna** (w.r.t. Center-of-Mass)
- Offset of **laser retro-reflector array** (w.r.t. Center-of-Mass)

Stations do not need to be co-located !

GNSS satellite co-locations



GNSS satellite co-locations



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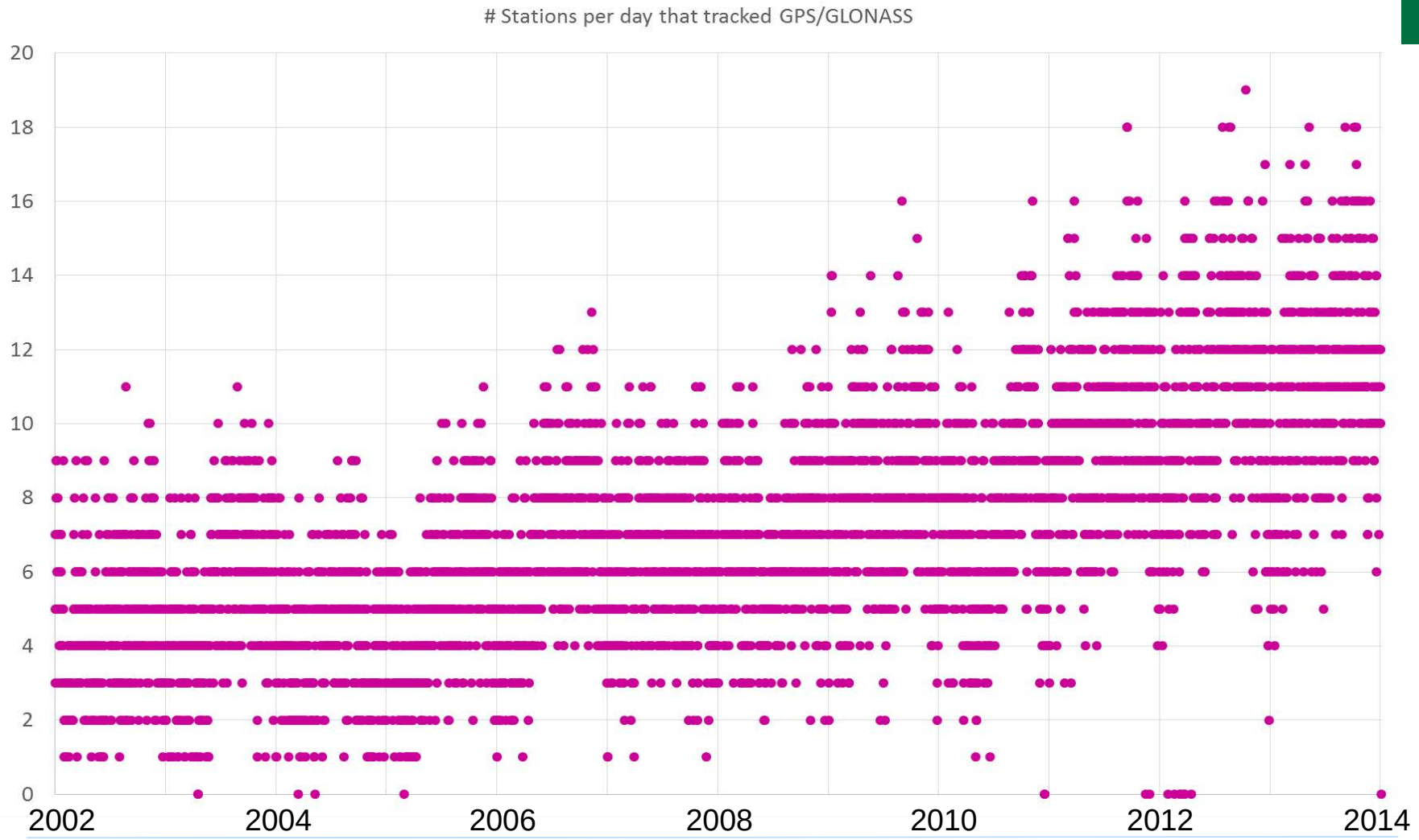
GNSS satellite co-locations



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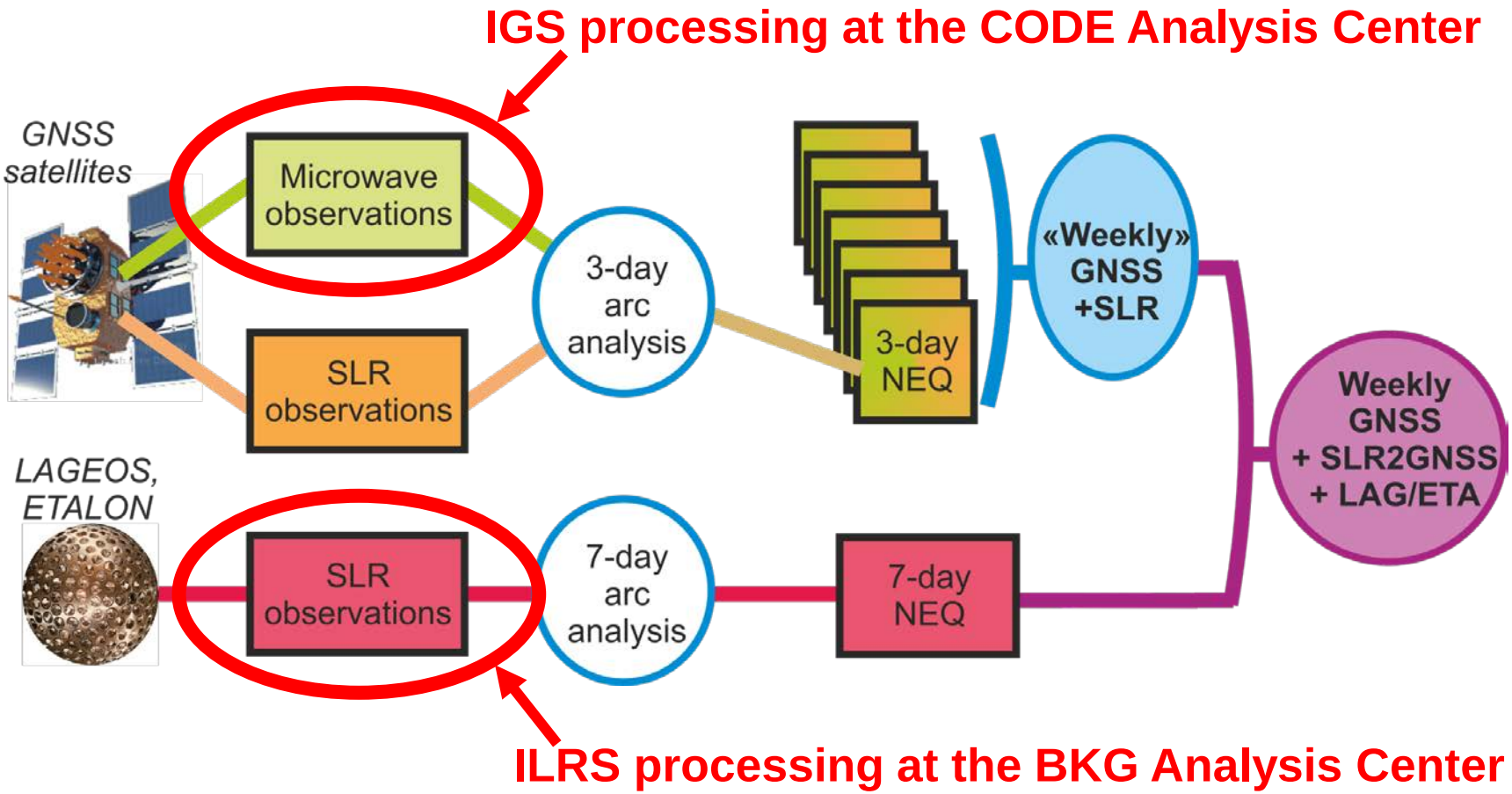
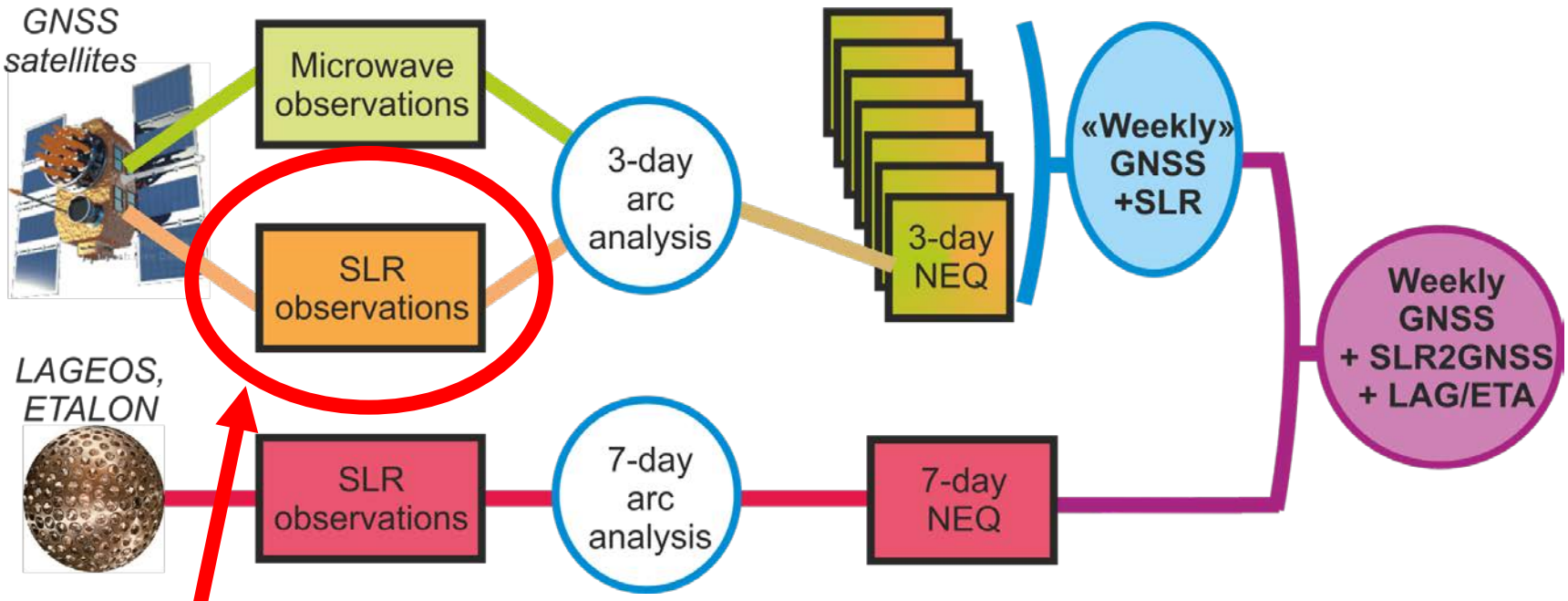
Pre-combined GNSS-SLR solutions from CODE



Pre-combined GNSS-SLR solutions from CODE



Using **co-locations at GNSS satellites** for connecting both techniques

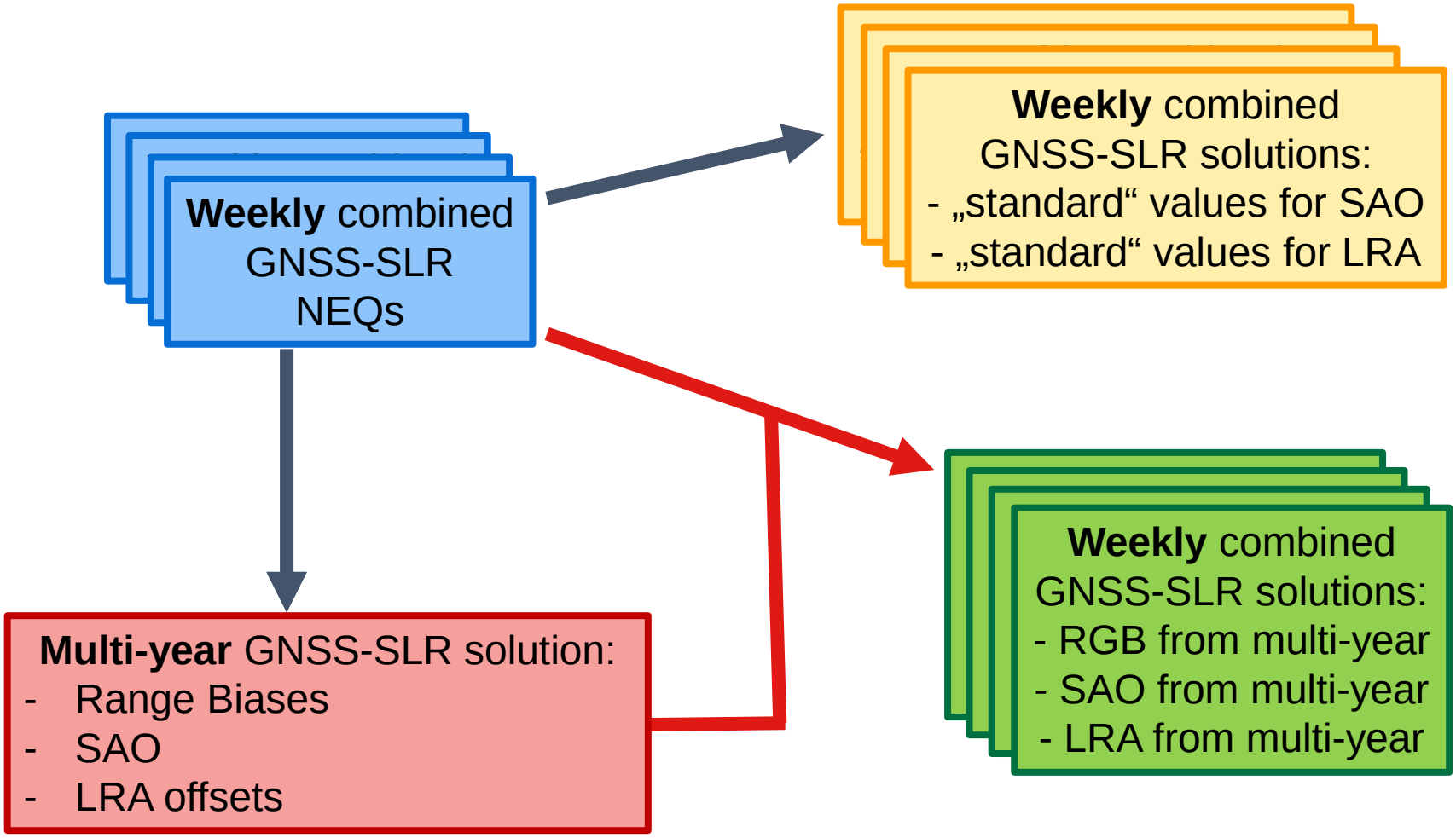
Common parameters

Direct combination

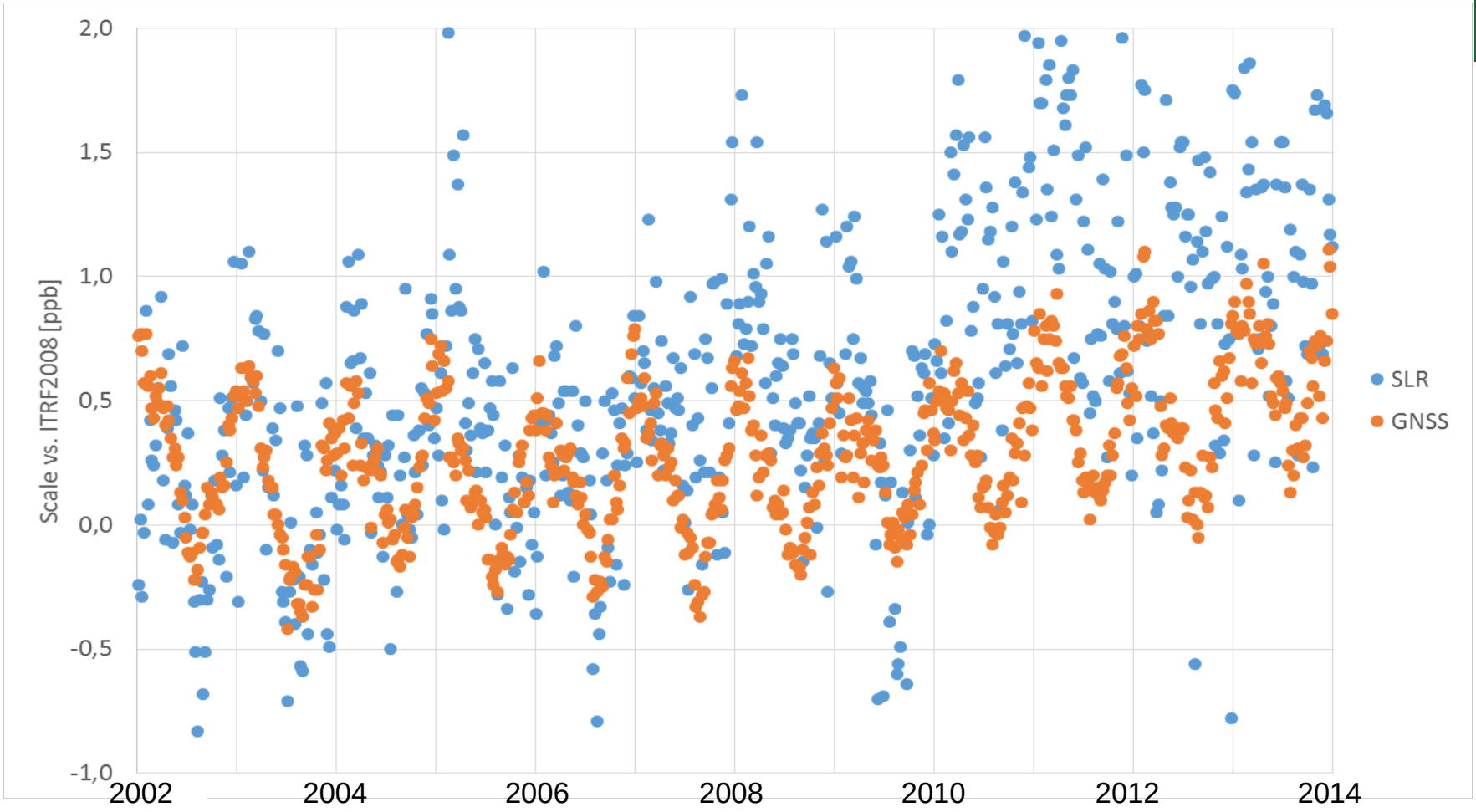
(Indirect combination by applying **correction terms)**

	GNSS microwave	SLR @ GNSS	SLR spherical satellites
Station coordinates	GNSS	SLR	SLR
ERP	X	X	X
Geocenter	X	X	X
Orbits GNSS satellites	X	X	
Microwave Sat. antenna offsets	X		
Laser Reflector Array offsets		X	
Range Biases		X	(X)
Orbits spherical satellites			X

Strategy for pre-combined solutions



Scale w.r.t. ITRF2008



Mean SLR = 0.57 ppb Mean GNSS = 0.28 ppb

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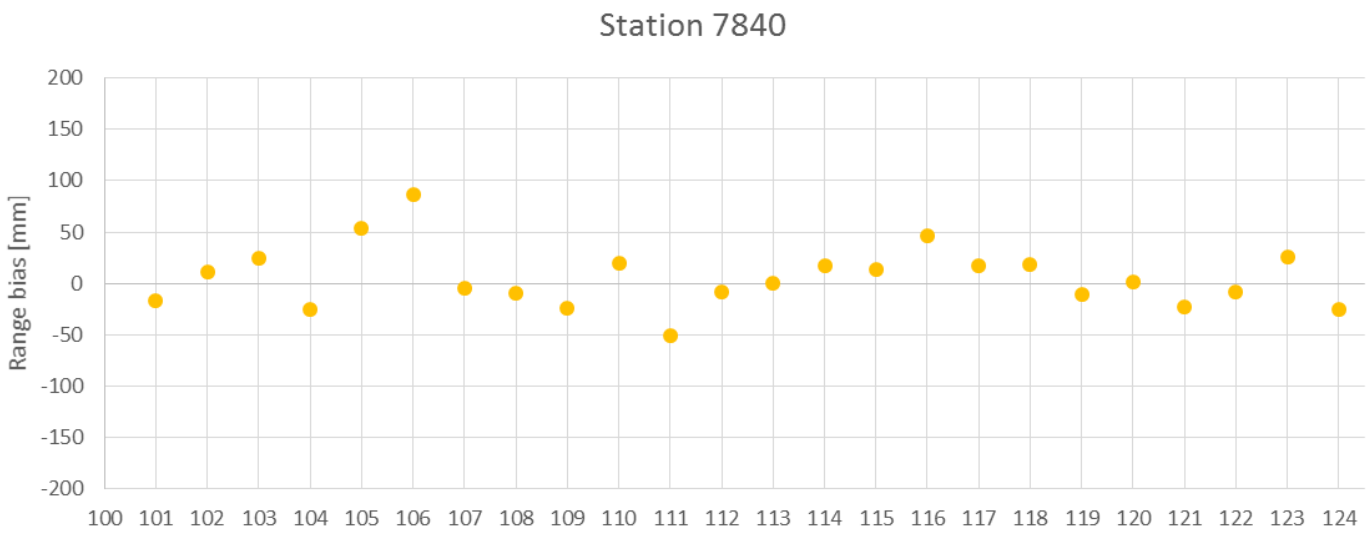
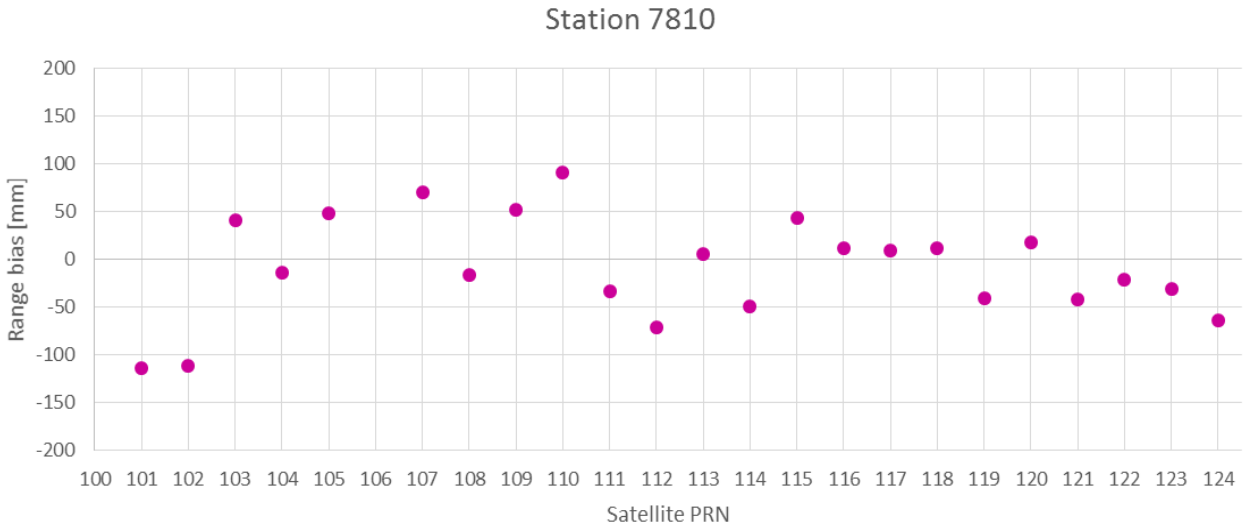
Range biases





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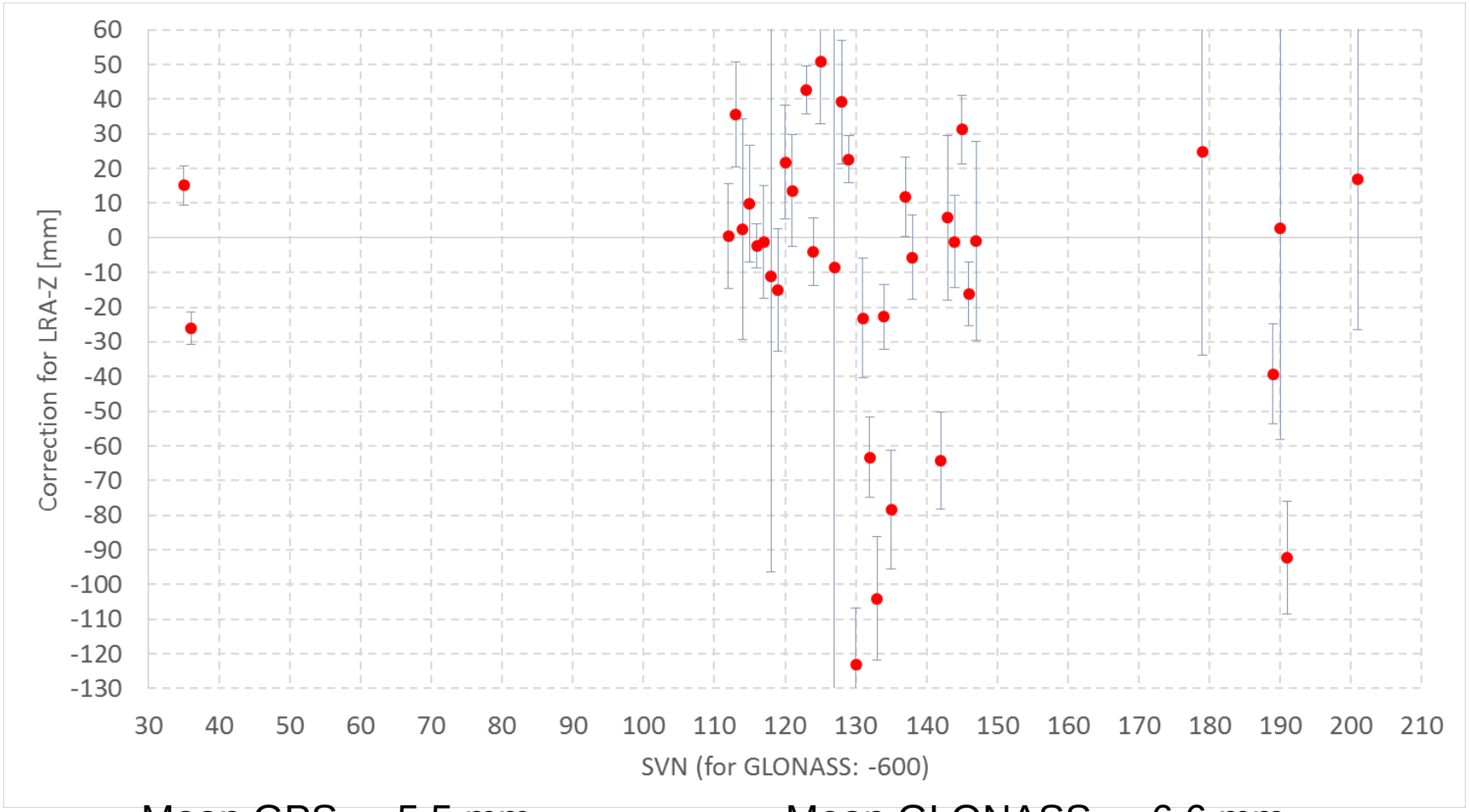
Laser retro-reflector array offsets



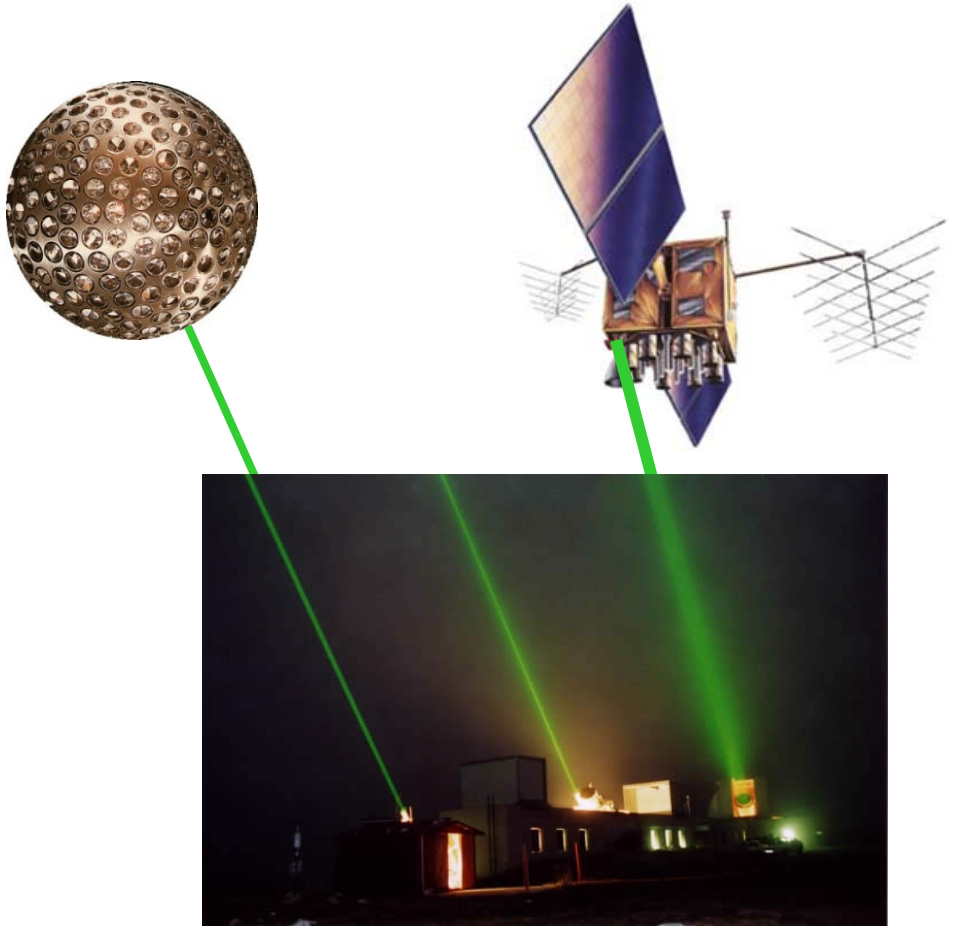
Mean GPS = -5.5 mm

Mean GLONASS = -6.6 mm

Summary

- Satellite co-locations provide an additional connection to strengthen inter-technique combination
- More data from space-geodetic stations are included in reference frame computation
- „To Do“ for our contribution to ITRF2013:
  - Generate best-possible multi-year solution
  - Verify Range Biases, SAO and LRA corrections
  - Generate weekly SINEX

Thank you for your kind attention!



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